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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/811,597  
Filing Date: March 29, 2004  
Appellant(s): PRASHER, RAVI

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Nathaniel Levin  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed May 13, 2008 appealing from the Office action mailed January 15, 2008.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

There are no related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

5,239,200	Messina et al.	8-1993
6,489,551	Chu et al.	12-2002

3,232,719	Ritchie	2-1966
6,711,904	Law et al.	3-2004
6,410,970	Otey	6-2002

### **(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina ('200) in view of Chu et al. (U.S. Patent 6,489,551).

As to claims 1-4, Messina discloses an apparatus as shown in figure 6 comprising:

an integrated circuit (IC) die (16) having front and rear surfaces;

a member, which is a heat spreader (14 having a cap 20) to define at least one micro-channel defined a groove (22 and 46) at the rear surface of the IC die (12), the microchannel to allow a coolant to flow therethrough (column 3, lines 34-36).

Messina does not disclose at least one thin film thermoelectric cooling (TFTEC) device in the at least one microchannel and formed on a rear surface of the die.

Chu shows a module (10) as shown in figure 1 comprising a thin film TEC device (20, column 4, line 23, and column 5, lines 15-16) formed between a thermal space transformer (22) and a chip (12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a TFTEC as taught by Chu employed in the apparatus of Messina in order to provide active temperature control..

As to claims 5-7, Messina discloses the member is formed of copper, or silicon, see column 3, lines 24-27.

As to claims 8-9, Messina discloses the coolant includes water or de-ionized water (column 3, lines 34-35).

As to claim 11, Messina discloses the member is bonded to the rear surface of the IC die.

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Messina in view of Chu as applied to claims 1-9, 11 above, and further in view of Ritchie (U.S. Patent U.S. Patent 3,232,719).

Regarding claim 10, Messina as modified by Lewis does not disclose the TFTEC device made from silicon germanium superlattice or beryllium telluride (BeTe).

Ritchie (U.S. Patent 3,232,719) discloses a thermoelectric bonding material (1) made from beryllium telluride, column 2, lines 30-37, column 3, lines 29-35.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a TFTEC made from BeTe as taught by Ritchie employed

in the apparatus of Messina and Chu in order to provide excellent bonding and reduce cracking due to different CTE mismatches.

4. Claims 15, 23-25, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina in view of Chu as applied to claims 1-9, 11 above, and further in view of Law et al. (U.S. Patent 6,711,904).

As to claims 15, 23-25, Messina and Chu as modified discloses all of the limitations of the claimed invention, Messina discloses the IC die is connected to a substrate (12).

Messina as modified by Chu does not specific disclose the connection of the IC to the microprocessor.

Law et al. shows a semiconductor device comprising a connection between a chip (106) on a surface of a microprocessor (105).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a microprocessor connected to a chip component as taught by Law employed in the apparatus of Messina and Chu in order to processing data.

Regarding claims 27-28, Messina as modified by Chu and Law et al. shows a coolant circulation system and a power supply (the system and the power supply are inherent because without the power supply then there is no power to operate the system) to the microchannel and a TFTEC device.

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5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Messina in view of Chu as applied to claims 1-9, 11 above, and further in view of Otey (U.S. Patent 6,410,971).

Regarding claim 16, Messina and Chu do not disclose the at least one TFTEC device includes at least one pair of stacked TFTEC devices.

Otey shows a flexible thermoelectric module (10), see figure 1 having a pair of flexible substrate (12, 13).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a pair of TFTEC as taught by Otey employed in the apparatus of Messina and Chu in order to provide excellent bonding and reduce cracking due to different CTE mismatches.

6. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Messina in view of Chu and Law, and further in view of Ritchie.

Regarding claim 26, Messina as modified by Chu and Law does not disclose the TFTEC device made from silicon germanium superlattice or beryllium telluride (BeTe).

Ritchie (U.S. Patent 3,232,719) discloses a thermoelectric bonding material (1) made from beryllium telluride, column 2, lines 30-37, column 3, lines 29-35.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a TFTEC made from BeTe as taught by Ritchie employed in the apparatus of Messina, Chu, and Law in order to provide excellent bonding and reduce cracking due to different CTE mismatches.

**(10) Response to Argument**

Appellant argues:

**a)** The combination of Messina and Chu does not analogous art.

Examiner disagrees. Messina discloses an apparatus for cooling an array of integrated circuit (IC) chips mounted on a substrate (see an abstract, or column 1, lines 7-10), and Chu teaches an electronic module having an integrated thermoelectric cooling assembly (see an abstract and column 1, lines 35-58). Both of the references (Messina and Chu) teach a cooling structure mounted on an IC or chip to reduce heat from the IC or chip.

Since the both references teach the same field; therefore, they are analogous arts.

Therefore, the combination of Messina and Chu is proper.

**b)** The combination of Messina and Chu does not appear to appellant that "either the references (Messina and Chu) refers to the teaching of a thin film thermoelectric cooling device (TFTEC) having a function as an active temperature control."

Examiner disagrees. The term "thin film thermoelectric cooling device or TFTEC" defines a function to use as a temperature control or a high cooling density. Chu teaches an integrated thermoelectric cooling assembly (20) mounted on a chip (12) to remove the heat from the chip when it active. So the thermoelectric



cooling assembly (20) of Chu does the same function as the high cooling density or temperature control for the chip. Therefore, the motivation of Chu employed in the cooling structure of Messina meets the requirement of claimed invention. Therefore, the combination of Messina and Chu is proper.

c) The combination of Messina and Chu fails to result a TFTEC of Chu in Messina apparatus.

Examiner disagrees. As explained in portion (a) above, the both references are the same field and analogous arts for cooling structure formed on the chip/component. Chu shows a module (10) in figure 1 comprising a thin film TEC device (20, column 4, line 23, and column 5, lines 15-16) formed between a thermal space transformer (22) and a chip (12).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a TFTEC as taught by Chu employed in the micro-channel (22, 46) of a heatsink member of Messina's apparatus in order to provide active temperature control and high cooling density.

Therefore, the combination of Messina and Chu is proper.

d) The combination of Messina and Chu fails to disclose "at least one of the TFTEC devices being formed on the rear surface of the IC die."

Examiner disagrees. As explained in portion c) above, the combination of Messina and Chu teaches the TFTEC device of Chu capable of being used in the

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micro-channel of the heat sink of Messina. The TFTEC device is indirectly contact on a rear surface of the IC die or in the other word the TFTEC device is formed on the rear surface of the IC die through a heat transfer module (100) of Messina.

Therefore, the combination of Messina and Chu is proper.

**(11) Evidence Appendix**

The statement of the evidence appendix contained in the brief is correct.

**(12) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Tuan T Dinh/

Primary Examiner, Art Unit 2841.

Conferees:

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